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Haemonchus contortus Infestation in Lambs

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Use of the McMaster slide (Gordon & Whitlock, 1939) has greatly reduced the time necessary for examining flocks and herds for gastro-intestinal infestations. The problem remains, however, of deciding what levels of faecal egg counts are to be taken as indicating serious parasitic infestations. The great variation in egg-laying capacity of different species makes it advisable to have some idea of the particular species present if the degree of infestation is to be assessed from the faecal egg count. *Haemonchus contortus* is stated to produce about one hundred times as many eggs per female worm as *Ostertagia* or *Trichostrongylus* spp. (Gordon, 1933). An egg count of 5,000 eggs per gramme (e.p.g.) might mean, on the one hand, an infestation with 100 *Haemonchus* or it might indicate the presence of 10,000 *Ostertagia* or *Trichostrongylus*. The observations in this note illustrate the very high egg counts characteristic of *Haemonchus* infestations and give some idea of the egg-laying ability of this species; they also show that lambs at pasture carrying several hundred *Haemonchus* may be in good condition and show no evidence of anaemia.

OBSERVATIONS

Our observations concern a group of 16 lambs, born of Scottish half-bred (Border Leicester × Cheviot) hoggs crossed with a Suffolk ram. The ewes and lambs formed part of a flock used for a feeding experiment at the Institute during the first six months of 1946. The ewes had been indoors since tupping in the autumn of 1945 and the lambs were born indoors in the spring of 1946. The ewes and lambs were turned out to grass for the first time on June 24th, 1946, with a view to fattening them for market. For the first three weeks they grazed some poultry runs which were known to have been heavily worm-infested in 1945 and had been grazed by half-bred gimmers in the spring of 1946. In the middle of July the animals were put into fields of three- to four-year-old grass which had been grazed by Blackface hoggs until April, 1946. On September 6th, the ewes and lambs were turned out on hill pasture where they remained until they were slaughtered on September 27th, 1946. The reason for slaughtering instead of sending them to market as originally planned was that one of the lambs, a twin lamb which had done poorly from birth, when killed *in extremis* a week earlier was found to be carrying a heavy burden of *Haemonchus contortus*. It was therefore thought of interest to determine the *Haemonchus* burden of the remaining lambs. The ewes were sent to market and were not examined.

A week before the lambs were slaughtered samples of faeces taken from the rectum were examined by the McMaster method and showed counts which, with the exception of one lamb with less than 100 e.p.g. were all 2,000 e.p.g. or more, one having a count of 39,800 e.p.g. (see fig. and [over-leaf] table). In some samples there were a few *Nematodirus* and *Strongyloides* eggs.

Immediately after slaughter the abomasums of the 15 remaining lambs (lamb 95 had been killed one week earlier) were brought to the laboratory and the worm burden was determined by repeated sedimentation of the abomasum contents, direct counting of the *Haemonchus* present, and determination of the other helminths in two or three 40 ml. samples of the total contents made up to 4,000 ml. Care was taken to examine the abomasum folds for *Haemonchus* after removal of the contents.

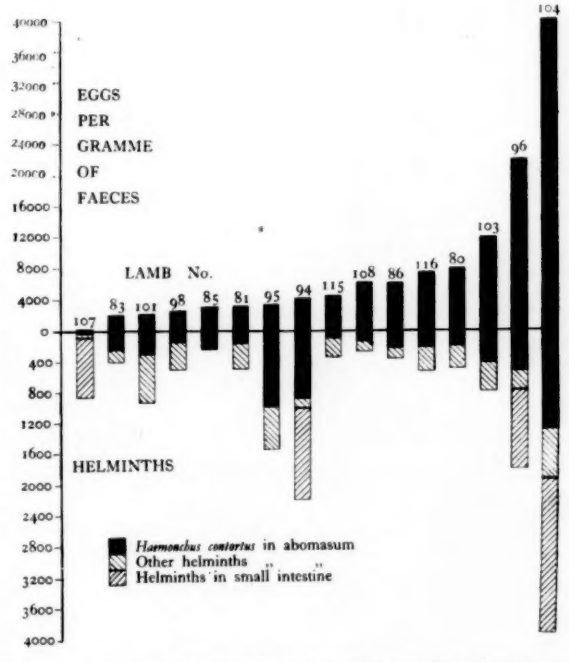
The *Haemonchus* burden ranged from 29 to 1,288 (table) and the number of other helminths in the abomasum did not exceed 630. It seemed, therefore, that the only parasite in the abomasum which could be considered of importance was *Haemonchus*. The worm burden in the small intestine of three of the lambs, as well as lamb 95, was also determined and the largest number of helminths found was 2,000, of which about half were *Nematodirus*.

Relation between Faeces-Egg Count and Worm Burden

It will be seen (table and fig.) that in general the egg count was proportional to the number of *Haemonchus* present. The smallest number of *Haemonchus* (29) was found in lamb 107 with less than 100 e.p.g., and the largest number (1,288) in lamb 104 with 39,800 e.p.g. Two lambs, 94 and 95, form an exception to this general relationship, both having a large number of *Haemonchus* (992 and 888 respectively) but relatively low egg counts (3,300 and 4,000 respectively). It is of interest that these were twin lambs, one of which (lamb 95) was killed a week before the others because of its poor condition, while the other was a fat lamb with the greatest weight gain at pasture of the whole group.

It may be objected that since other eggs than *Haemonchus* were included in the counts these other species may have had an appreciable effect on the egg counts. That this is unlikely, however, is shown by the fact that lamb 107 had less than 100 e.p.g. although it had 750 helminths in the small intestine and 50 helminths other than *Haemonchus* in the abomasum. It is well known that *Haemonchus* lays many more eggs than *Ostertagia*, *Trichostrongylus* or *Nematodirus* and there is no doubt that the relatively heavy infestations of this parasite in the group of lambs were responsible for most of the eggs found in the faeces. It was noted that not more than about 10 per cent. of the eggs in any sample were *Strongyloides* spp.

If it is assumed that 75 per cent. of the eggs in the samples were *Haemonchus* and that male and female worms were present in approximately equal numbers (this was so in four animals examined) it can be calculated that on an average each female *Haemonchus* produced 30 e.p.g. of faeces. Taking the daily faeces output as 300 grammes, this means a daily production of 9,000 eggs per female worm. A lamb with 1,000 *Haemonchus*, of which 500 were females, would thus excrete some 4,500,000 eggs per day in its faeces when the worms were at the peak of egg-laying. These figures agree well with those of Gordon (1933) who cal-



RELATION BETWEEN WORM BURDEN AND FAECES EGG COUNTS IN A GROUP OF 16 LAMBS AT PASTURE.

Haemonchus contortus infestation in lambs. (Animals arranged in order of increasing *Haemonchus* burden.)

Lamb no.	E.P.G. fresh faeces one week before slaughter	Worm Burden: Abomasum		Worm Burden: Small Intestine		Live Weight Gain at Pasture (lb.)			† Haemoglobin (Haldane %)	
		H. contortus	Other Helminths	*Nematodirus* Spp.	Other Helminths	Initial Weight	Final Weight	Weight gain in 13 weeks	Initial	Final
107	< 100	29	50	500	250	15¼	55½	40¼	70	80
115 *	4,400	87	250	—	—	12	47	35	79	90
98	2,600	149	350	—	—	27¾	66	38¼	71	76
108	5,100	157	125	—	—	24½	65	40½	83	76
81	3,000	170	350	—	—	24½	57	32½	77	80
116 *	7,600	222	200	—	—	12½	47½	35	81	96
86	6,000	229	125	—	—	32½	71	38½	76	90
85	2,800	230	0	—	—	23½	58½	35	80	74
83	2,000	253	150	—	—	34½	76	41½	80	78
80	8,000	267	125	—	—	23½	65	41½	72	80
101	2,200	287	625	—	—	29	77½	47½	84	86
103 **	12,000	423	375	—	—	16	51	35	69	76
96	22,000	523	250	1,000	2	29½	69	39½	71	78
‡ 95 ***	4,000	888	100	700	550	12½	22½	10	68	74
94 ***	3,300	992	475	—	—	21¼	68½	47¼	54	74
104 **	39,800	1,288	630	1,200	800	10¼	30	19¾	70	72

*, **, ***, Twin Lambs.

† N.P.L. calibrated apparatus and standard were used. The values in the table have been corrected for the personal error of the observer, determined against the performance of the best observer in the M.R.C. test of observers [M.R.C. Spec. Rept., Series 252. Haemoglobin levels in Great Britain in 1943 (with observations upon Serum protein levels). H.M.S.O., 1945.]

‡ Killed one week before the other lambs.

culated that *Haemonchus* produced 37·5 and 73·5 e.p.g. per female worm in two lambs experimentally infected with *Haemonchus* and *Trichostrongylus* and in which egg counts, larval differentiation, and worm burdens were determined.

Effect of *Haemonchus* on the Host

That numbers of *Haemonchus* similar to those found in these lambs may be present without causing serious ill effects is suggested by the observations of Kauzal (1933) in Australia, who found over 500 *Haemonchus* in 4 per cent. of fat sheep examined at abattoirs: one lamb contained 2,690 *Haemonchus*. This author considers that egg counts of at least 20,000 e.p.g. are required for a diagnosis of dangerous *Haemonchus* infestation when this species is the only one present in large numbers. Fraser and Robertson (1937), working at this Institute, found as many as 2,100 *Haemonchus* in fat lambs slaughtered in the months of August and September.

It is clear that several factors influence the effect of helminths on the host. In young lambs, where age resistance does not play a part, these factors probably include natural (genetic) resistance and nutrition. The fat lambs examined by Fraser and Robertson (1937) were from a commercial flock fed on ewe's milk, concentrates, and pasture, and no anthelmintic treatment was used.

Much experimental work has been devoted to the study of *Haemonchus* infestation, particularly to the way in which this parasite causes haemorrhage and anaemia (Fourie, 1931 ; Boughton & Hardy, 1935). Anaemia similar to that caused by experimental infestations has been reproduced in healthy sheep by repeated bleedings from the jugular vein of amounts of blood similar to those which were calculated from determinations of faecal haemoglobin to have been lost through haemorrhage caused by *Haemonchus* (Andrews, 1942). It is of interest that in the lambs which we examined, and in which routine weekly haemoglobin determinations were made from birth, there was no fall in haemoglobin (table). Furthermore, if the twin lambs are excluded since some of them were small at birth and did not thrive well indoors, there was no retardation of live-weight increase. This suggests that lambs on good pasture can carry up to 1,000 *Haemonchus* without adverse effects on live weight or haemoglobin level. It will be seen in the table that the average haemoglobin level was in fact slightly higher just before slaughter than when the animals were first turned out to graze and it may be added that there was no suspicion of helminth infestation in the group of lambs until an autopsy was carried out on lamb 95 one week before the group were to be sent to market.

Conclusions

1. In a group of 16 lambs at pasture, egg counts up to 39,800 eggs per gramme (e.p.g.) were found and all except one animal showed 2,000 or more e.p.g.

2. The *Haemonchus* burden ranged from 29 to 1,288 and the number of *Haemonchus* was in general proportional to the egg count. Other helminths in the abomasum ranged from 0 to 630, and not more than 2,000 were found in the small intestine of four lambs examined.

3. The high output of eggs in *Haemonchus* infestation should be borne in mind when assessing the significance of faecal egg counts. Since a few *Haemonchus* may be responsible for an egg count as high as that produced by much heavier infestations of other pathogenic helminths, an effort should always be made in worm surveys to see whether *Haemonchus* is present, either by slaughtering one or two animals and examining the worm burden or by determining the species of worm present by examination of larvae from faeces cultures.

What Animals Owe to Experimental Research *

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For purposes of this address I propose to deal with some aspects of that line of research involving the use of animals directed to the elucidation of many of the problems of the causation, prevention and relief of various diseases in animals, many of which are also transmissible to the human being. Any form of experimental research involving the use of animals in the course of such investigation is included in the term vivisection. This is rather unfortunate since that term is disposed to conjure up in the mind of the uninitiated various forms of torture involving cutting experiments. It is a fact that the very great majority of so-called vivisection experiments involve no cutting whatever, and consist either of injections with a hypodermic needle, causing no more discomfort than the pricking of a pin, or of feeding experiments which cause absolutely no pain whatever. It is obviously a misuse of words to apply the term "vivisection" to such cases.

Many humanitarian laymen are disposed to think of animal research as consisting of the use of animals with the object of obtaining results that may be serviceable as applied to human beings, and with no benefits available to the animal kingdom and therefore unjustifiable. This is far from being true and I hope to be able to show that enormous benefits are made available to animals by the methods of experimental research so that much pain and suffering are prevented or relieved. These results could never have been obtained without the help of experimental research. Such advantages are especially outstanding in the fields of preventive medicine with the development of sera and vaccines; with the advances in the use and safety of anaesthetics and analgesics, and pharmaceutical or therapeutic agents, and in the field of general and special nutrition.

It is unnecessary to devote much time to the question of anaesthetics, general and local, for the boon they confer is so obvious and so well recognized, and is incalculable. The vast majority of these agents were either discovered or perfected as the result of experimental research. Hundreds of thousands of essential and otherwise painful operations are annually performed on animals without the infliction of any pain or suffering whatever with the help of general and local anaesthetics (cocaine, procaine, etc.) and various barbiturates (nembutal, etc). In my own personal clinical work such cases have mounted to many hundreds, possibly thousands, annually. The advances in this humanitarian phase of surgery in recent years have been tremendous, and all veterinary surgeons throughout this country as a routine measure resort to the use of anaesthetics on every possible occasion to prevent and relieve pain. The total benefits from this source alone can only be vaguely estimated. I recall quite vividly the state of affairs when I was a student 50 years ago and the anguish I myself experienced when essential operations were often carried out without the boon of anaesthesia, so much so that I seriously contemplated relinquishing my youthful ideal of becoming a veterinary surgeon. By the methods then available, the administration of chloroform to dogs and cats was almost equivalent to signing their death warrant. Certainly we did resort to narcotics and analgesics such as opium and morphia, chloral hydrate and bromides, but it can readily be appreciated how inadequate such measures were. It was in these circumstances that Hobday carried out long series of experiments in producing anaesthesia in dogs and cats with inhalants such as chloroform and ether, either alone or combined, or with the addition of alcohol, and with or without preliminary narcotization with morphia. Later I was privileged to assist very materially in the clinical application of these methods, which have gone on improving until the one time physical torture to the patient and mental anguish to the operator have both been practically abolished. The same may be said of the introduction and use of barbiturates, notably nembutal intravenously administered, especially for small animals. To J. G. Wright, now of Liverpool University Veterinary School, belongs the credit for much patient work in this connection both for surgical purposes and for euthanasia. For the latter purpose it almost approaches perfection, and many suffering animals whose recovery is hopeless are given the benefit of euthanasia by nembutal. It is now often resorted to for pets belonging to the most sensitive and almost neurotic owners, the nembutal being administered while the patient is sitting undisturbed in the lap of a devoted mistress who is just only preparing for what she expects to be an ordeal and suddenly realizes that it is all over. I consider this an almost ideal "passing over," so different from the old methods involving, to say the least of it, very considerable mental anguish to both the animal and its owner, and I would emphasize that it has only become available as the result of much patient experimental research. As long ago as 1914 I was invited to present a paper on "Anaesthesia—General and Local" at the International Veterinary Congress that year. My paper was then "up to date" but in the light of the present position it is almost amusing in its simplicity and elementary character. Such has been the progress in this sphere of work.

With regard to therapeutic agents a very great deal could be said. The recent progress in the introduction of new remedies is just colossal and it may be unnecessary to point out that such progress would have been quite impossible if the methods of experimental research had not been available.

It is only possible to-day to refer to a few of the many instances in which animals have benefited and are daily benefiting as a result of this great team-work and combined efforts of chemists, pharmacologists, bacteriologists, veterinary surgeons and others. I have already referred to the barbiturate group and the great advances they have effected in the direct relief of pain and suffering in animals and man.

The discovery of the sulphonamides and the perfection of their use have only been established by experimental research, so often miscalled vivisection methods, and surely must be regarded as one of the discoveries of the age. Indeed there is danger in the fact that some of them, such as sulphapyridine, have gained an unfortunate popularity with the "man-in-the-street" and "M. & B. 693" is tending to become a "cure-all." People are disposed to take it themselves and to administer it to animals quite indiscriminately with anything but favourable results. Such abuse should be checked as far as possible. On the other hand their introduction has enabled us to give relief to, and to save the lives of, thousands of animals suffering from the pneumonias, streptococcal and other affections. While many members of this group are being increasingly used in daily veterinary practice for the benefit of animals, probably that most extensively used at the present time is one of the earliest discovered, namely, sulphanilamide, which is very widely employed in the treatment of a form of contagious streptococcal mastitis in cows which is responsible for considerable injury to the mammary glands and a consequent great loss of milk for the community. It may surprise many of you to hear that it was conservatively estimated before the war that 25 per cent. of the total population of cows in milk in this country were affected with mastitis, *i.e.*, about 800,000 affected cows which meant a loss of 48,000,000 gallons of milk a year. The use of sulphanilamide, particularly in the early stages of this disease, brings about favourable results in anything from 60 to 90 per cent. of cows in affected herds. These favourable results cannot be claimed as complete cures in such a high percentage, but they are definitely clinical cures in that no defect can be detected by ordinary clinical methods, and bacteriological methods are necessary to establish the fact that some degree of streptococcal infection still remains, and in some circumstances may give rise to a recurrence of clinical symptoms. These results are of inestimable benefit to cattle and to the milk supply, but the fact that they stop short of complete cure serves to emphasize the necessity for the continued and painstaking experimental research which is being carried out at a number of veterinary research institutions.

It was inevitable, then, that the discovery of penicillin with its remarkable effect on various organisms brought to light an agent that seemed to give promise in the treatment of mastitis. It was investigated in America where penicillin was readily available. A report was issued last year (1946) by the Committee on Animal

* Sixteenth Stephen Paget Memorial Lecture, delivered under the auspices of the Research Defence Society at Manson House, Portland Place, W.1, on June 17th, 1947, Lord Hailey in the chair. The lecture was illustrated by lantern and films. Publication in full authorized by the Lecturer and the Committee of the Research Defence Society.

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Health, National Research Council, U.S.A., on "The intramammary therapy of bovine mastitis." Agents used included Acriflavin (1:1,500), Silver Oxide (5 per cent. in mineral oil), Tyrothricin and Gramicidin, Sulphanilamide (suspended in mineral oil and injected into the udder, four injections on successive days) and Penicillin (in doses of 25,000 to 50,000 units in water per quarter injected once a day for four consecutive days). This last named produced a cure in the majority of cases of *Streptococcus agalactiae* infections. Penicillin also shows greater promise against *Staphylococcus aureus* in the udder than any of the other therapeutic agents now in use. These various agents have been tested out in this country and the American results largely confirmed, so that with the exception of sulphanilamide and penicillin other agents are falling into disuse, especially since penicillin has been made available for the treatment of bovine mastitis in this country. A group of workers who participated in trials for the Agricultural Research Council reported (*Vet. Rec.* (1946) 138) that a high percentage of *Streptococcal agalactiae* affections can be sterilized with a minimum amount of udder disturbance by injection of penicillin by the teat canal and that the injection of 20,000 units on two occasions at daily intervals is the method of choice. The results up to date are therefore most encouraging but much has yet to be done in the way of experimental research to discover and to develop the best methods of its application.

The discoveries of therapeutic agents for the treatment of various affections have resulted from extensive experimental research and many of these agents are so spectacular in their effects that they might well be regarded as specific. One or two examples of them may be taken; a full list of them would be far too numerous to detail. It should be noted, of course, that the discovery of such remedies marks only the later stages of research into the particular disease and that much essential earlier work was necessary to elucidate the aetiology and methods of spread of the disease.

The disease *redwater* in cattle used to take a tremendous toll of life in most tropical countries. It is due to parasites (*Babesia bigeminum*) which invade and destroy huge numbers of red corpuscles—up to 75 per cent. of them in bad cases—and which are inoculated by ticks of several types. By the use of an agent (trypanblue) discovered by experiments on animals this loss and the attendant suffering sustained by the victims can now be reduced to almost insignificant numbers. In some countries the disease has been almost exterminated by repeated dipping as a means of tick control. A similar affection in dogs in tropical Africa and Asia due to *Babesia canis* carried off 80 per cent. of all dogs in affected areas. It is now curable by a single injection of trypanblue. Redwater in cattle also occurs in the British Isles due to a somewhat similar blood parasite (*Babesia divergens*), also tick-borne. It causes a high mortality in some areas and often a prolonged illness. This can now be reduced to a "three-day" illness by the early use of acaprin (piroparv or pirevan).

While dealing with these intra-corpuscular parasitic blood affections, reference should be made to the most spectacular result of the campaign in the Union of South Africa against the so-called *East Coast fever* due to the tick-borne *Theileria parva* which may invade as many as 75 per cent. of the red blood corpuscles which, however, are not destroyed as is the case in redwater. The average time from the day of infection until death is about 30 days. It usually results in 95 to 100 per cent. mortality, and so presents one of the greatest problems in the cattle industry in South Africa. This will be appreciated from the fact that there are approximately 9,000,000 head of cattle in the East Coast fever areas and potential East Coast fever areas. As the result of experimental research preventive inoculation was practised in the earlier days of control with effective protection of 80 per cent. This, however, was not sufficient and the other line of approach in the way of tick control by repeated dipping was adopted. In this campaign approximately 6,000,000 cattle are subjected to regular dipping in 0·16 per cent. sodium arsenite solution once a week in summer and once in two to four weeks in winter. As you will realize, this is a tremendous task and a very expensive one, but is more than justified by the fact that the number of cases in 1944-45 was only 92 and in 1945-46 there were only two cases.

Rinderpest or cattle plague at one time threatened to exterminate the cattle in South Africa. The last really large-scale outbreak occurred in 1896-98. In very many instances whole herds were completely wiped out and over 2,000,000 cattle are said to have died. Methods of immunization, crude as they were in comparison with present methods, saved many thousands of cattle. But the great triumph as the result of intensive experimental research has been the perfection of immunization technique and the total eradication of cattle plague from the Union of South Africa. But the authorities must be ever watchful to prevent its re-introduction from territories to the north which might easily take place when one considers the extent of the frontiers across which infected cattle could stray or be driven. In Tanganyika territory the position is improving every year, but here and in Central Africa the position is seriously complicated by the fact that many species of game are susceptible and the presence of cattle plague amongst these animals is a constant source of anxiety. The point is that if it were possible to apply vaccination to game, the game themselves would be saved and so would the spread of the disease to cattle by game.

The importance of the rinderpest problem is emphasized by the following extract of a report of a conference of veterinary experts held in Nairobi in February this year. It says: "Three times during the last half century rinderpest has swept southwards through East Africa, passing from game to cattle, and from cattle to game with disastrous effects on both. The last large-scale outbreak occurred during the war and this was stopped at the southern border of Tanganyika by prompt and vigorous action in immunizing very large numbers of cattle with the assistance of officers sent from South Africa and other territories lying to the south of the critical area." The report stresses the numerical inadequacy of the field staff of veterinary officers which should be augmented as soon as possible. It is officially stated that the capital represented by cattle, sheep and goats in East Africa is not less than £30,000,000. The veterinary department of Kenya has supplied 8,000,000 doses of biological products in the year.

I would like here to emphasize the enormous amount of suffering which defies imagination and from which animals have been saved. Cattle plague is an extremely painful disease due to the nature of the local lesions occurring in this virus-produced affection. There are multiple ulcerative and necrotic lesions in various parts of the body and particularly in the alimentary tract, resulting in severe and cramping abdominal pain, grunting, grinding of the teeth, arched back, the beast constantly looking round at its flanks in pain, and a blood-stained diarrhoea with severe straining often resulting in eversion of an inflamed rectal mucous membrane. Emaciation is rapid and weakness very pronounced, and death follows in susceptible stock in from four to eight days. If all this terrible suffering has been avoided in hundreds of thousands, yes, in millions of cases, surely the methods of experimental research have been more than vindicated.

Anthrax affords another example of the benefits to animals of experimental research. Fortunately in this country anthrax is not very common and there is no necessity to resort to vaccination to prevent it. In tropical and semi-tropical climates, however, the causal organism—*Bacillus anthracis*—is capable of living and multiplying outside the animal body. In this way the soil once infected may, and often does, become increasingly dangerous to animals grazing on it, with a mortality amongst infected animals approaching 100 per cent. after a comparatively short, but in many species of animals an excruciatingly painful, illness. As in the case of rinderpest no curative measures are of any avail, and preventive inoculation is the only possible method of control. South African authorities regard anthrax as affording one of the best examples of the potency of vaccines. This is emphasized by the fact that in the calendar year 1945 the Onderstepoort Laboratory issued over 6,000,000 doses of anthrax vaccine. A personal statement to me from an official source by one of my former students says: "A few years ago anthrax was very rife in Northern Zululand and the Transkei Territory, entirely native areas where there are about one and a half million cattle. Annual block inoculation was introduced with the result that it is very rare now to meet with a case of anthrax." But let us come a little nearer home!

A disease of young cattle known as "*blackleg*" or "*black-quarter*" is due to a soil organism (a clostridium) normally present in the soil in many parts of the world and quite extensively in this country. It is a most painful affection involving the skeletal muscles in any part of the body, but most commonly those of the hind quarter, with violent inflammatory symptoms and gas formation. It is almost invariably fatal. It is heavily enzoötic and in infected areas it is quite impossible to prevent exposure to infection since the young cattle must be permitted to graze. The only possible means of control is preventive inoculation. I have known farms where over 50 per cent. of the calves born died of blackleg before they were 18 months old. In one acute outbreak on a small farm 19 out of 20 calves died within a week and after a violently painful illness. Immunization of calves is, however, amazingly effective and reduces the death-rate to less than 1 per cent. of animals vaccinated. From two laboratories alone over 50,000 doses of vaccine are issued each year—a small proportion of the total for this country alone. From one laboratory in South Africa last year's issue exceeded one and one-third million doses, and in India they must have been greater still. In fact many millions of calves are vaccinated annually and saved from severe suffering. One year in India (1929-30) careful records were made and showed that amongst 127,981 animals inoculated against black-quarter the death-rate was 1/85th of that of the uninoculated in the same

outbreaks, and since that date methods of immunization have made very considerable improvement.

One can cite numerous instances in this country where, although the numbers are so very much smaller, the results of vaccination are equally spectacular. On one particular farm in my personal experience it had been very difficult to rear calves. Most of them died of blackleg before they were a year old owing to the heavy infection of the grazing pastures. The farmer was advised by his veterinary surgeon to adopt preventive inoculation. This was done and for several successive years there was a total absence of the disease. As he was losing no calves from this disease the farmer thought infection must have become eradicated from the farm and that continued vaccination was an unnecessary expenditure. Contrary to his veterinary advice he decided to discontinue it with the result that three-fourths of the calves born on the farm that year died of black-quarter; a striking example of a "penny wise, pound foolish" policy.

Contagious abortion (brucellosis) in cows is all too rife in this country as elsewhere in the world. Unfortunately this is not a scheduled disease and cases are not reported so that it is not possible to give exact figures as to its occurrence. It is, however, estimated that not less than 10 per cent. of all calves are prematurely born as the result of brucella infection. The majority are stillborn and most of the rest are weak and unthrifty and rarely attain maturity. As a result of commonly retained foetal membranes infected cows frequently develop a chronic catarrhal metritis with resulting sterility and there is a considerable reduction in the milk yield. Indeed the Survey Committee of the National Veterinary Medical Association calculates that the annual loss of milk from this source is no less than 40,000,000 gallons involving a monetary loss of several million pounds a year. The loss from dead calves and ill-health of the cows should be added to this to get some idea of the total loss involved. As the result of experimental research in animals it has been abundantly established that vaccination of young heifers does effectively prevent infection and is preferably carried out between the ages of four and eight months. One laboratory in this country issues about three-quarters of a million doses of vaccine annually in addition to very many thousands of doses by other laboratories, probably swelling the total to over 1,000,000 doses a year.

I imagine that some reference to *tuberculosis* as a disease of cattle may be expected, but the subject is so vast that I propose to make only a brief reference to it—the brevity serving perhaps to emphasize its great importance. It is estimated that no less than 30 per cent. of dairy cattle in this country are affected, but no official figures are available. After infection the progress of tuberculosis in animals is usually slow and insidious and often with no clinical symptoms until well advanced. The result of this is that an infected animal may be a source of danger to others long before any suspicion is aroused, therefore methods of early diagnosis are imperative. By guinea-pig and cattle experiments tuberculin has been shown to be a satisfactory diagnostic agent, and with its aid there is good prospect that tuberculosis of cattle may ultimately be eradicated from this country and so reduce its incidence in man. Already many attested and tubercle-free herds are established. Several million doses of tuberculin are issued annually by the veterinary laboratory of the Ministry of Agriculture for diagnostic use in cattle, swine and poultry.

With regard to horses I will mention only two of the numerous instances in which that species has received enormous benefits as the result of experimental research, namely glanders and tetanus.

Glanders used to take a big toll of equine life in Great Britain, particularly amongst industrial horses of large towns. All clinically recognized cases were fatal. It was readily transmissible to human beings, especially stablemen, and veterinary surgeons have lost their lives as the result of glanders contracted from equine sources. Experimental research revealed the cause (*Bacillus mallei*) and the channels of spread of the disease. A method of early diagnosis was evolved by means of the Mallein test so that the presence of the disease could be revealed in the preclinical stage. By the application of this test together with intensive preventive measures and thorough disinfection glanders has been exterminated from Great Britain and there has been no confirmed case here for the last 20 years.

Tetanus was, and still is, a serious disease of animals, especially horses. It is largely enzoötic and due to an organism (*Cl. tetani*) commonly found in the soil, especially in some localities. When a horse is infected recovery is extremely rare and it is fortunate that immunization can now be carried out with almost absolute certainty. In some heavily infected areas it is now customary to actively immunize most of the horses as a routine measure and in the case of accidental wounds and even prior to the infliction of surgical wounds anti-tetanic serum is injected to provide a passive immunity to cover the period of healing and cicatrization of the wounds. By this practical application of the results of experimental research a very considerable amount of pain and suffering amongst horses is thus prevented.

There are several devastating and painful diseases of sheep occurring in Great Britain which can now be controlled as the result of experimental research. One of the most outstanding is so-called "*Lamb Dysentery*." This is a highly contagious disease of young lambs characterized by inflammation of small and large intestine and usually accompanied by ulceration. It is caused by a special type of *Clostridium welchii* generally referred to as the "lamb dysentery bacillus," which is present in the intestines and tissues of lambs affected with lamb dysentery, in the intestines of adult sheep grazing on pastures on which lamb dysentery cases occur, and, of course, in the soil of such pastures. Lambs become infected very soon after birth, usually within three to five days, and in the acute type lambs apparently well one evening may be found dead next morning. In less acute cases symptoms may persist from one to three days before proving fatal. There is evidence of severe abdominal pain as shown by persistent bleating of the lamb, and frequent attempts to micturate and defaecate. Pressure over the abdomen is painful. Recoveries are very rare and treatment of affected cases is useless. The total mortality on an affected farm may be as high as 50 per cent. or more of all lambs born there.

One can imagine the immensity of such problems; with newly born, highly susceptible lambs exposed almost immediately after birth on pastures, etc., that cannot possibly be sterilized, developing an acutely painful condition for which no curative measures are available. In these circumstances the discovery by Dalling of an effective means of control by the use of serum or vaccine was really a godsend, and, of course, it was only arrived at as the result of much patient experimental research. Many of my hearers may be interested to know that there are two methods by either of which the disease can be almost completely controlled. One method is by the inoculation of the newly born lambs with hyper-immune serum. This is nearly 100 per cent. effective. In one series of experiments carried out by Dalling, the mortality amongst 456 inoculated lambs was 1·9 per cent. compared with 22·6 per cent. among 425 uninoculated lambs on the same farm. It is essential that the serum be injected as soon as possible after birth—within twelve to 24 hours. The other method consists of inoculating the breeding ewes by means of a formalinized culture of the lamb dysentery bacillus about ten days or a fortnight before the mating season begins and again about ten days before lambing begins in the flock. The ewes thus develop an active immunity which, however, is apparently not transmitted to the lamb *in utero*. In the actively immune ewe there is a high concentration of antibody in the colostrum and on sucking the lamb receives the antibody which is absorbed from the intestine and a passive immunity is conferred. This is the method adopted on hill farms where it is not possible to handle lambs within twelve hours or so after birth, and on such farms losses from lamb dysentery have been reduced to a minimum by vaccination of ewes.

For the prevention of this and other sheep diseases such as braxy, strike or blackleg, etc., well over a million doses of serum and vaccine are employed every year in Great Britain with the prevention of an incalculable amount of suffering.

Swayback in lambs. This name, commonly used, is really descriptive of the chief symptoms of a nervous disorder of newborn and young lambs, the outstanding symptom of which is ataxia. It is characterized by progressive and sometimes massive destruction (demyelination) of cerebral white matter which results in severe and usually fatal paralysis. It occurs in various parts of Great Britain, and though in many districts it has a low incidence there are districts in which it is enzoötic, and occurs with disastrous periodicity.

The primary cause of swayback is unknown but it is definitely linked with a trace element deficiency since the administration of small amounts of copper to ewes throughout gestation prevents the disorder appearing in lambs. Yet it is not due to a copper deficiency *per se* as it may occur on farms where the copper content of the grass and soil is normal, and the copper reserves in the blood and liver of affected lambs and their mothers may not be altered. The disease appears identical with one occurring in Australia, India, S. America and Sweden. The symptoms are very characteristic but vary in degree of severity. All show ataxia; some appear paralysed at birth; some are unable to stand or walk and lie helpless; some show only a slight weakness of the hind quarters and a rocking or straddled gait. Many are blind. There is no fever and remissions do not occur. In the severe cases the mortality is 100 per cent., particularly of those showing marked symptoms at birth. The mildest cases may not be observed until some weeks after birth and may only show slight unsteadiness when walking. Some of these may survive, and may be fattened later.

On *post-mortem* examination the viscera are normal unless inter-

current pneumonia has occurred. The cerebral white matter shows a diffuse gelatinous degeneration and in the severe cases there may be liquefaction and cavitation. There are no haemorrhages and the meninges appear normal.

The proof of the trace element deficiency is furnished by the fact that swayback can be prevented from appearing in the progeny of susceptible ewes by allowing the latter throughout the gestation period to have access to salt licks containing 1 per cent. of copper. Copper licks should be used regularly in all areas where the disease appears to be enzoötic.

I hope to show a film of this affection, the prevention of which is a striking commentary on some of the benefits resulting from experimental research. (I am indebted to Dr. J. R. Innes, M.R.C.V.S., of the I.C.I. Biological Laboratories, for the loan of the film.)

In pigs in this country there are perhaps two outstanding diseases which should be referred to, namely, swine erysipelas and swine fever.

Swine erysipelas is very prevalent and until a few years ago was responsible for very great losses amongst pigs, estimated at about 20 per cent. of pigs affected. Vaccination has reduced the incidence to much smaller numbers, and in any outbreak the early use of serum prevents its extension to other pigs exposed to infection and cures most of those in the early stages of the disease. By this means the death-rate in an outbreak may be reduced to less than 1 per cent. The amount of vaccine and serum now being used annually in this country is very large indeed. It is interesting to note that Stockman stated that in Hungary of four million observations the death-rate amongst inoculated animals was reduced to 1·6 per cent. (from 20 per cent. or more).

In the case of *swine fever* extensive immunizing experiments have been carried out with crystal-violet vaccine and this is stated by the Veterinary Laboratories of the Ministry of Agriculture to give as nearly complete protection for twelve months as it is possible for a biological product to do. It is now being issued to veterinary surgeons by the Ministry and other laboratories for general use and will undoubtedly result in great benefits to the swine population.

The story of the benefits enjoyed by animals as the result of experimental research could be enormously extended; and, indeed, it has only been possible for me to touch the fringe of the subject. But in order to make the circle more complete as referring to domesticated animals I suppose I should refer to poultry and to dogs, and I do so very briefly.

In poultry, *fowl-pox* (a highly contagious disease with high mortality) is well under control as the result of vaccination. The vaccine is produced from pigeons and a quarter of a million doses are issued by the Ministry of Agriculture and Fisheries annually.

Bacillary White Diarrhoea (Pullorum disease) causes great losses in chicks and in poultry and egg production in widely dispersed areas in this country. It is now getting under control as the result of easier methods of early diagnosis by agglutination, and there are now about 3,000 accredited flocks of poultry in the country in which the disease is practically non-existent.

With regard to dogs and cats those of us who are engaged in clinical work have the best opportunity of assessing the great benefits received as the result of experimental research, and the consensus of opinion is that its value exceeds all imagination. One or two examples must suffice.

The experimental work on nutrition by Mellanby and others has resulted in the reduction of the incidence of *rickets* almost to vanishing point and when it does occur its cure is simple and easy. This applies equally well to all other species of domesticated animals. Mellanby's later work on the part played by treated flour in the cause of nervous affections offers great encouragement and emphasizes the necessity for still further experimental research in these fields.

Distemper and *rabies* are probably the greatest scourges affecting the canine race. We are fortunate in that of those two diseases we have only distemper in this country. I estimate that not less than 50 per cent. of dogs born in this country used to die of distemper and many of the survivors suffered from troublesome sequels throughout their lives. The distressing nature of this disease is probably all too well known to most of you, and I am sure you will agree that all possible steps are essential to prevent and reduce the suffering to which our canine friends are exposed by this disease. With the advent of distemper prophylaxis the incidence is enormously reduced; and in my wide experience I assert that the Laidlaw & Dunkin method of immunization is effective in over 90 per cent. of dogs vaccinated. Perhaps just at the present time this should be somewhat modified as there have recently been a considerable number of cases where it has failed. It would seem to me that the probable cause of this unfortunate occurrence is the introduction of a new strain of virus against which the antibodies of the Laidlaw-Dunkin virus are ineffective, *i.e.*, that as in the case of foot-and-mouth disease, there are more than one strain of virus and that these strains have no cross-immunizing antibodies. If that is so, the solution of the problem must be the introduction of a poly-valent vaccine and serum. Much more experimental research is necessary in the hope of solving this problem.

Rabies (hydrophobia) occurring in dogs and other animals and man is certainly one of the most terrible of all diseases. In many countries it is a constant menace. Affected dogs are uncontrollable. They run from home and are disposed to attack and infect any animals and human beings in their way. As the result of experimental research we know the cause and methods of transmission of this awful disease and we have been able to exterminate it from this country and prevent its re-introduction by means of rigid quarantine of all imported dogs. As dogs are the main source of infection, an incalculable benefit to animals and man has resulted from a systematic immunization of dogs in countries where rabies is rife. The effect is most successful and I would quote an extract from a personal communication received just before the war from the Commissioner of Inspection and Sanitation for Kansas City. He says: "For a number of years prior to 1927 this city was visited regularly with an epidemic of rabies in which a large number of animals died of the disease. Many persons were bitten and were compelled to take Pasteur treatment. The prevalence of rabies in this city in 1927 was high. Action was taken by the City Council and the compulsory law (vaccination of dogs) was enacted. As a result there has been a steady decline of rabies in so far that to-day we have scarcely any at all, and such cases occur in outlying districts where the enforcement law has failed. We have vaccinated some 150,000 animals and find that less than five breaks have occurred in the vaccinated group. To any city desiring to control rabies and do an act of human kindness to dumb animals the vaccination of all dogs is recommended. The experiences of this city disprove any claim of anyone that vaccination is harmful to the animal."

I fear I may have gone on far too long and quite exhausted the patience of my listeners. There is so much more that could be said, but I trust I have amply shown that practically all species, of domesticated animals at any rate, do reap and enjoy most remarkable benefits as the result of experimental research, and no veterinary surgeon could possibly do his duty to the animal world unless he took full advantage of the remarkable discoveries by various research workers, and particularly those of his colleagues in the veterinary research institutes.

ABSTRACT

[The Ecology of the Sheep Tick, *Ixodes Ricinus L.*; Distribution of the Tick on Hill Pasture. Milne, A. (1946.) *Parasitology* **37**. 75-81.]

The author states that the number of ticks (nymphs) on typical hill pastures is governed by the thickness of herbage subject to the overriding influence of altitude. In night lairs (always located in the upper reaches of a hill grazing) the number was significantly lower than on the general pasture, whilst on sheep tracks (walks) there was little difference in comparison. Thus, he points out, when improving typical hill pastures to control ticks, attention should be focused on the lower slopes or where the vegetation is thickest.

Milne shows that on a uniform hill pasture, a significant variation in the tick (nymph) population existed in every 100 square yards with a similar variation from acre to acre in 50 per cent. of cases. As a general rule, therefore, prior to making any assessment of the efficacy of such treatment, especially in non-replicated plot experiments and on hill grazings carrying only a few sheep, primary estimation of tick numbers both on the treated and on the control plots should be made.

In all these population estimations Milne used the blanket drag method, which he has discussed [Milne, A. (1943.) *Ann. Appl. Biol.* **30**. 240] and regards as an indirect method, measuring as it does the *activity* of the tick at the time. In this method the nymphs are used as indicators, two or three sets of simultaneous drags 25 to 50 yards being made on not less than 20 days during the tick season, using a virgin strip of ground for each day during the season.

W.T.R.

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Weekly Wisdom

No one has ever explored the bases of intellectual freedom in the modern community, and they may prove to be far more flimsy than the intellectual worker, flinging his mind about in the apparent security of his study, imagines.—H. G. Wells: "The Fate of Homo Sapiens." (1939.)

THE VETERINARY RECORD

August 30th, 1947

EXPERIMENTAL RESEARCH

THERE is often considerable misapprehension amongst the general public as to the aims of research involving the use of experimental animals and the benefits derived from scientific enquiries of this nature.

The Research Defence Society, which was founded with the object of correcting such false impression as may arise, has been instrumental in countering the efforts of certain sections of society to put a stop to animal experiment. Most scientists are fully aware that constant vigilance is necessary but it is regretted that the Society does not receive fuller support from individual members of the medical and veterinary professions.

Amongst its other activities, the Society has rendered a signal service by sponsoring a series of public lectures in memory of Stephen Paget who devoted his energies to the cause of scientific research. The most recent Stephen Paget Memorial Lecture, given by Professor G. H. Wooldridge, and published in the current issue, approaches the problem from a new angle. In his admirable lecture, Professor Wooldridge rightly points out that, quite apart from advantages to the human race, benefits which are frequently overlooked by the general public, accrue to the animal population as a result of organized research and are the means of preventing much suffering. He has given an impressive résumé of the progress which has been achieved since the inception of the Pasteurian concepts of the causation of disease. He says: "Enormous benefits are made available to animals by the methods of experimental research so that much pain and suffering are prevented or relieved. These results could not have been obtained without the help of experimental research."

The public must be made aware that future progress may be seriously impeded if the biological worker is unfairly handicapped. It must also be pressed home that whilst in many directions the scientist must perforce use living animals because no other method is available, every effort is made to evolve new avenues of approach to research problems which will avoid experiments on animals. Two examples will suffice to illustrate this point. The assay of diphtheria and tetanus antitoxins which 25 years ago entailed extensive experiments on guinea-pigs, can now be largely undertaken *in vitro*, thanks to the perfection of the flocculation test by Ramon, Glenny and others. Turning to more recent times, the isolation and serological identification of influenza viruses can be achieved by the use of the developing egg and the red cell agglutination test so that these methods are tending to supersede the ferret and mouse formerly required for these purposes. Doubtless, future research will point the way to similar methods of solving other problems, but until this goal has been reached, the use of experimental animals must form an integral part of future biological researches.

Capt. C. A. Fowke, M.B.E., M.C., has been appointed as Central Organizer of the Domestic Poultry Keepers' Council in succession to Mr. A. P. F. Grant. M.B.E., who has retired from the public service. Capt. Fowke will continue to act as Area Organizer for the Southern area.

CLINICAL COMMUNICATION

Torsion of the Small Colon in the Horse Corrected by Surgical Interference

By

T. T. McNAUGHT, M.R.C.V.S. AND M. R. McCREA, M.R.C.V.S.

Chepstow

Subject.—Five-year-old Shire mare, at grass and in fair condition.

History.—On May 5th she was found to be dull and not eating. The owner had administered several pints of linseed oil.

Symptoms.—At examination on May 8th symptoms shown were general depression and inappetence. The mucous membranes were injected, the pulse rapid and full and the temperature was 101° F. There was evidence of abdominal pain with distention, absence of peristalsis and the occasional passage of flatus and very small amounts of liquid faeces. The mare was continually pawing the bedding and attempting to lie down.

Diagnosis.—On rectal examination, at a distance of 25 inches from the anus, a torsion of the colon with adhesions was palpated. A finger tip could be inserted into the commencement of the torsion.

Prognosis.—Grave, especially as the mare had been in pain for three days and was toxaemic. Attempted correction by laparotomy was advised as it was considered that the condition of the colon would not allow correction by any other means.

Treatment:

(1) *Operation.*—The mare was led to a field and the area of the left flank clipped. Anaesthesia adopted was chloral hydrate intravenously, a 10 per cent. solution plus 1 per cent. sodium citrate being administered until the mare went down. Slow injection was then continued until deep anaesthesia was reached as judged by the reflexes.

A 15 inch incision was made downwards and forwards, commencing at a point three inches anterior to the external angle of the ilium. This was continued through the aponeurosis of the external oblique; then the fibres of the internal oblique and transverse abdominal were separated. The peritoneum was incised and the operator was able to insert an arm into the incision. Contact was then established with the anaesthetist, who was palpating the torsion per rectum, and the operator was able to break down the adhesions of the serosa and straighten the colon. As soon as the torsion was reduced the rectum filled with liquid faeces. Sterile sulphapyridine was dusted in the incision and the peritoneum closed with a continuous catgut suture. The muscle layers were sutured separately and the skin incision closed with tape.

(2) *After-treatment.*—The operation commenced at 9.30 p.m. and was completed at 10.45 p.m. The patient was then propped on her sternum; 3,000 I.U. tetanus antitoxin were administered. The mare rose unaided at 3 a.m. and was led to a loose box.

On May 9th the mare was brighter and defaecating with a little pain. The faeces were very liquid. This was thought to be due to the amount of linseed oil given and the superpurgation was treated with kaolin. As a prophylactic a four-day course of sulphonamide therapy was instituted and the wound dusted daily with sulphonamide powder.

On May 13th superpurgation was still marked and the mare was very weak. Treatment was altered to pulv. opii, catechu and kaolin. There was some under-running of the base of the skin incision with gaping of the edges. Drainage was established and from this point the skin incision gradually closed by granulation. The mare was eating well, the diet consisting of bran and hay twice daily. The remainder of the time she was kept on short pasture.

On May 19th the remaining skin sutures were removed. The mare was stronger. A small quantity of oats was added to the diet.

On May 30th purgation was still marked but it was found that the owner was turning the mare on to some strong pasture. This was rectified and the mare soon commenced to gain weight. The incision was practically healed.

On June 18th the mare had an attack of spasmodic colic. This responded to normal treatment and the cause appeared to be the owner's over-zealous application of the principles of convalescence, as he was feeding 15 lb. of oats to the mare daily. Rectal examination at this time showed the site of the torsion to be marked by a slight fibrous thickening in the colon wall.

July 23rd: The mare is progressing satisfactorily.

Veterinary Medicine records that from a test by the Bureau of Dairy Industry, U.S.D.A., it was concluded that penicillin has no practical application in the preservation of milk or other foods.

REVIEW

["Maladies Infectieuses des Animaux Domestiques." By G. Curasson (Vigot Frères, Paris).]

This work is so detailed and so vast in scope that a detailed review would occupy many pages. It must therefore suffice to say that it is written with all the French clarity and logic, that the information contained in it bears every evidence of an immense and accurate erudition, and that the sections, chapters, and method of arrangement of material is so clear and standardized throughout that it is a pleasure to consult it as a work of reference. Should an English translation appear, no veterinary surgeon with any claims to an intelligent interest in his profession could afford to be without it.

NOTES AND NEWS

Diary of Events

Sept. 5th.—Meeting of the South Wales Division, N.V.M.A., at Llandilo (King's Head Hotel), 2 p.m.

Sept. 10th.—N.V.M.A. Committee meetings at 36, Gordon Square, W.C.1: Parliamentary and Public Relations 11.30 a.m.; General Purposes and Finance, 2 p.m.

Sept. 11th.—Ditto: Veterinary State Medicine, 10 a.m.; Organizing, 2 p.m.; Technical Development (running concurrently with Organizing), 2.30 p.m.; Home Appointments, 3.45 p.m.

Sept. 12th.—Meeting of Council, N.V.M.A., at the Connaught Rooms, Kingsway, W.C.2, 11 a.m.

Sept. 17th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1. (*Members are asked to note change from second to third Wednesday in the month, for this meeting only.*)

Sept. 19th.—Meeting of the Lancashire Division, N.V.M.A., at Bolton (Town Hall), 3 p.m.

Sept. 23rd.—Meeting of the Southern Counties Division, N.V.M.A., at Blandford, Dorset (Crown Hotel). Full Notice will be given later.

Sept. 25th.—Meeting of the Derbyshire Division, N.V.M.A., at Thurgarton, Notts (Boots' Establishment), to follow Luncheon at 1.30 p.m.

Sept. 27th.—Extraordinary General Meeting of the Association of Veterinary Inspectors, at the Royal Veterinary College, Camden Town, London, N.W.1, 2 p.m.

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Guide to Veterinary Surgeons Officiating at Small-animal Shows

The above has been printed as N.V.M.A. publication, No. 13, and copies are now available to members of the Association on application to 36, Gordon Square, London, W.C.1.

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Expansion of Agricultural Output

Emphasis on Livestock Production

On Thursday of last week the Minister of Agriculture presented the first—and, we may add, the foremost—of the Ministerial programmes designed to meet Britain's economic emergency, outlining measures to secure a 20 per cent. increase in the output of the agricultural industry by 1951-52.

His announcement of revised prices for livestock and livestock products, payments for improvement of livestock standards, and new and extended subsidies was associated with an appeal for an increase in acreages of wheat, barley, linseed, and potatoes. The Minister also intimated that the provision of houses for rural workers had been given the same priority as houses for miners.

The new levels of livestock production, expressed as percentages of pre-war production and compared with the peak war year and 1946-47 (taking the pre-war level as 100) are as follows:—

	1934-44	1946-47	1951-52
Milk	101	107	123
Eggs	61	78	152
Beef and veal ...	83	93	110
Mutton and lamb	79	70	77
Pigmeat ...	37	32	92

These figures, including those for the principal crops, also for products not specified, if translated into output available for sale, and adjusted for requirements of imported feeding-stuffs, represent an expansion of 50 per cent. compared with pre-war, of 15 per cent. compared with the war-time peak of 1943-44, and 20 per cent. compared with 1946-47. The targets set out in the recent White Paper (Cmd. 7022) are considerably exceeded, and the new programme involves an immense effort, greatly surpassing the highest output of the agricultural industry hitherto. Even so, it is hoped that these figures will be exceeded.

A uniform expansion, product by product, is not envisaged, but the emphasis has been deliberately placed on dollar-saving products. This means a pronounced change compared with the war years, when the emphasis was on saving ships. Almost all products save dollars directly or indirectly, but particularly important are pigmeat, eggs, beef, mutton, cereals, and linseed. The Government's programme, therefore, is essentially one of reviving and expanding the production of meat and eggs, restoring part of the war-time expansion of wheat and barley, and adding to the crop area no less than 400,000 acres of linseed.

Feeding-Stuffs

On present prospects, considerably increased quantities of feeding-stuffs should be available from abroad by 1949, and these, says the Minister, in conjunction with increased home supplies, seem likely to be sufficient to maintain the larger numbers of livestock for which the programme provides. Additional rations for pigs and poultry this winter have already been announced, and it has also been stated that farmers will be free to reserve for stock feeding 20 per cent. of the millable wheat and barley of their own growing of the 1948 crop. Plans are also being made for substantially expanding and improving the conservation of grass for winter use, and it is expected that a greatly increased supply of silage and dried grass, together with home-grown linseed cake, will materially relieve the shortage of protein feeding-stuffs.

The advisory services which have been set up will be available at all times to assist farmers in solving technical difficulties, and the agricultural executive committees will continue to guide farmers in reaching their production targets, and to assist them by the provision of services and facilities.

The new subsidies include a calf subsidy of £4 for every approved steer and £3 for each heifer calf reared to twelve months. To reduce the number of rejected calves the Minister is arranging the provision of beef bulls for free service at all artificial insemination centres. This, says Mr. Williams, in a further statement, does not imply any change in policy in regard to good dairy cows: it is as important as ever to rear good quality milking heifers. He asked district committees to secure the retention and distribution of all calves suitable for rearing, and to initiate a grass conservation campaign, both as silage and dried grass.

. . . . .

Both the National Farmers' Union and the National Union of Agricultural Workers have pledged their full support for the Government's plan, the former asserting: "There can be no doubt as to the response of this industry. We do not have strikes—we do not have a five-day week. When we have a sudden winter disaster everybody 'buckles to.' N.F.U. leaders in the counties have now accepted for the individual farmer his responsibility as a unit in the most vital component of British economy. There is not the slightest doubt that so far as human endeavour can go the goods will be delivered."

The Times comments that the price incentive for increased production has been given in full measure. On the feeding-stuffs situation it points out that both Mr. Williams and Mr. Strachey still seem far from confident about future supplies. "This is the crux of the matter. Rations of feeding-stuffs for commercial pig and poultry producers have been slightly increased from last year's low level, but until farmers can have the use of more feeding-stuffs, either imported or grown on their own farms, they will not be able to turn to their own and the nation's advantage the higher prices now promised for pig meat and eggs.

"It is to livestock that the Government are rightly looking for almost all the increase in output."

The agricultural Press welcomes the plan, with the reservation intimated in the following passage with which the *Farmers' Weekly* concludes the editorial in its issue of August 22nd: "After this week, we know financially how we stand and each farmer can work out his own potential development from this point of view. What we still await is a detailed statement on the supply of men and tools to translate 'potential' into 'actual.' That, now, is the crux of the situation and upon the Government's urgency in settling it the Government's own plan depends."

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The American College of Surgeons contributed $40,000 to the restoration fund of the Royal College of Surgeons of England.

The Ministry Dispute

Our own comment is that the Government's decision to rely for the success of its agricultural development programme largely upon an increase in livestock and livestock products throws into high relief the obligation thus laid upon it to ensure that no obstacle shall be allowed to impede the veterinary profession in fulfilling its role as an essential factor in the achievement of that aim. Such an impediment clearly exists in the continuing unsatisfactory status and salaries of the veterinary staff of the Animal Health Division of the Ministry of Agriculture.

In this connection, elsewhere in the issue quoted prior to our comment, the *Farmers' Weekly* observes : "Animal disease is estimated to cost this country something like £30,000,000 a year—which is a quite impressive chunk of the £100,000,000 super-effort now demanded of farmers.

"Isn't it, therefore, time something was done to end the dispute between the Ministry of Agriculture and the National Veterinary Medical Association over the conditions of employment in the Ministry's Veterinary Service ?

"The squabble has been going on for a long time and meanwhile the efficiency of the service is impaired and recruitment thereto hangs fire. Can't the stock-breeding societies get together and go after someone with a hatchet ? "

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PERSONAL

Births—Campbell.—At Inverard Nursing Home, Edinburgh, on August 15th, 1947, to Janet (*née* Rettie), wife of John Gordon Campbell, F.R.C.V.S.—a son.

Edwards.—On August 24th, 1947, to Nesta, wife of Clifford M. Edwards, Assistant Veterinary Investigation Officer, Bangor—a son (both well).

Howatson.—On August 18th, at Wishaw, to Mr. and Mrs. J. Howatson, Glenrosa, Carnegie Street, Dumfries—a brother for Elizabeth.

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Marriage.—Hanbury—Topping.—At St. Mary's Church, Kippington, Sevenoaks, on August 23rd, 1947, Denis Gordon Hanbury, elder son of Mr. and Mrs. G. G. Hanbury, of 16, Woodland Road, Derby, to Eileen Winghill Topping, only daughter of Dr. and Mrs. C. J. H. Topping, of Belle Vue, The Vine, Sevenoaks.

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Presentation to Mr. F. A. Davidson

In our issue of July 19th we announced that Mr. F. A. Davidson, B.Sc., M.R.C.V.S., Ministry of Agriculture Divisional Veterinary Inspector for Staffordshire, has been appointed to a similar post in Aberdeenshire, he being succeeded by Mr. A. L. F. Mullen, M.R.C.V.S., D.V.S.M., of the North Riding.

The Staffordshire Sentinel records a very pleasant ceremony at the Station Hotel, Stafford, when warm tributes were paid to Mr. Davidson on the occasion of his pending departure, and presentations made.

Those present were entertained to lunch by Mr. H. McIntyre, M.R.C.V.S., of Leek.

On behalf of the veterinary surgeons and farmers of Staffordshire, Mr. H. McIntyre and Mr. H. C. Brown presented Mr. Davidson with a group of china livestock figures and a wallet containing a substantial sum of money, and on behalf of the Ministry's Veterinary Inspectors, Mr. R. S. Wilson, M.R.C.V.S., presented Mr. Davidson with a pen and silver pencil, and reference was made to a presentation earlier in the week by the Divisional Office's clerical staff.

Mr. Davidson, in accepting the gifts, made reference to the grand co-operation he had had throughout his stay in Staffordshire.

A hearty welcome was extended to Mr. A. L. Mullen, who made appreciative acknowledgment.

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R.C.V.S. OBITUARY

Holmes, Samuel Edward, O.B.E., Major, R.A.V.C. (retd.), Warren Road, Reigate, Surrey. Graduated Edinburgh, December 14th, 1912. Died August 19th, 1947.

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UNIVERSITY OF LONDON EXAMINATIONS IN VETERINARY SCIENCE

Following is the July, 1947, Pass List for the Second Examination : Bainbridge, John Graham ; Betts, Alan Osborn ; Briault, Michael O'Meara ; Goddard, Arthur ; Morris, Robert Ernest ; Penhale, William George Allin ; Ryde, Paul Scrivener ; Smith, John Earle ; Stockwell, Valerie ; Whittlestone, John Franklyn, and Whittlestone, Peter (all of the Royal Veterinary College).

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AGGLUTINATION TEST FOR BRUCELLA ABORTUS INFECTION

The Ministry of Agriculture states that, by agreement with the laboratories which undertake blood agglutination tests for *brucella abortus* infection in cattle, an antigen of standard suspension is now used and the results of the tests are interpreted in a uniform way.

The standard adopted for a pass is now slightly more severe than that used by some laboratories previously and a larger proportion of agglutination tests than hitherto are now classed as indefinite.

It may be taken that agglutination at 1 : 10 dilution will be reported as indefinite in the case of an initial test, but it has been agreed that animals which consistently agglutinate at that dilution but not at higher dilutions may be accepted as having passed the test.

Owners who have animals for which they require a negative certificate should have them tested about four weeks before the certificate is required.

If as a result of the first test there is agglutination at 1 : 10, but not at higher dilutions, a second sample may be submitted for test between from two to four weeks after the first test. If this second sample shows agglutination at 1 : 10 only or none at all, the animal can be certified to have passed the agglutination test.

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COLONIAL DEVELOPMENT CORPORATION

Lord Trefgarne has accepted an invitation to become Chairman of the Colonial Development Corporation when it is formally constituted, and Sir Frank Stockdale has accepted an invitation to become Deputy Chairman.

Announcing this last week, the Colonial Secretary said that these appointments are provisional pending the passing of the necessary legislation for the establishment of the corporation, but they are announced at once so that further preliminary work may be undertaken on the urgent tasks awaiting the corporation. Other appointments are under consideration.

The House of Commons was informed on June 25th of the Government's intention to establish this corporation, when it was stated that the object of the proposed corporation would be to establish or assist enterprises in the colonies designed to increase their general productive capacity, and that the total borrowing powers of the corporation would be of the order of £100,000,000. The corporation would operate on commercial principles, but would act throughout in close consultation with colonial Governments in order to ensure that their activities were conducted in the way best suited to promote the welfare of colonial peoples.

Lord Trefgarne (formerly Mr. G. M. Garro-Jones) was born in 1894. He was Parliamentary Secretary to the Ministry of Production and Chairman of the Raw Materials Committee, Radio Production Committee, Location of Industry Committee, and Central Priority Committee. He withdrew from politics at the end of the war to attend to business interests. He was a member of the Empire Parliamentary Mission to the West African Colonies in 1928, and has travelled on business in British and French African Colonies and in the West Indies. It is understood that he will resign from the boards of Barclays Overseas Development Corporation (which operates in the Colonial territories) and from the British Overseas Airways Corporation.

Sir Frank Stockdale, who is 64, entered the Colonial Service in 1905 as mycologist and lecturer in agricultural science to the Imperial Department of Agriculture in the West Indies. In 1934 he became agriculture adviser to the Colonial Office, in 1940 he returned to the West Indies as Comptroller for Development and Welfare, and in 1945 was appointed Adviser on Development Planning to the Colonial Office, where he has been responsible for advising on the ten-year development plans submitted by the Colonial Governments.

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THE VETERINARY EDUCATIONAL TRUST

The stewards of the Royal Calcutta Turf Club have sanctioned a donation of £250 to the Equine Research Station organized by the Veterinary Education Trust at Newmarket. The Bath Racecourse Company has forwarded £396 4s. 6d. to the Trust arising from the sale of racecards at a recent meeting.

"*Racehorses of To-day.*"—Under this heading Arthur Ackermann & Son, Ltd., 3, Old Bond Street, W.1, announce an exhibition of approximately 30 oil paintings of horses (principally), greyhounds and cattle, by Juliet McLeod. The individual portraits include those of famous racehorses, stallions at stud, mares and foals, while there are a number of compositions of horse and dog subjects, greyhounds, draught horses and pedigree cattle. The private view will take place at their galleries on Tuesday, August 26th, the exhibition remaining open until Thursday, September 25th.

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A summary of the activities of the World Health Organization has recently been published in order to record the steps taken, through international action, to attain the highest possible standard of individual health throughout the world. The *Chronicle of the World Health Organization* (annual subscription 10s.) contains an account of the formation and constitution of the World Health Organization, setting out its aims and describing the various branches of public health maintenance in which the Organization is interested. Copies can be obtained from the World Health Organization, Palais des Nations, Geneva, Switzerland.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

JOHNE'S DISEASE

Sir,—On reading Mr. Matthews' valuable communication on this disease in your edition of the 16th inst., it occurred to me that the viewpoint regarding the possible influence of soil, or the herbage from it, is deserving of further exploration.

It is a strange fact that in this country (Eire) the disease has not become established despite the occurrence of isolated and infrequent clinical cases over many years. This unusual feature has always been a puzzle to us since it is difficult to reconcile with the characters of a purely infectious disease.

Yours faithfully,

W. Kearney,

Veterinary College of Ireland, *Professor of Pathology.*
Ballsbridge, Dublin.
August 16th, 1947.

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THE POSSIBILITIES OF BLOOD TRANSFUSION IN ANIMALS

Sir,—The "Clinical Forum" discussion of the Central Veterinary Society printed in your issue of August 9th, prompts me to write a few remarks on the above subject.

The benefits of blood transfusion are not so well established that the veterinary profession might be regarded as lax in not having exploited more fully the benefits of this therapy. Amongst large animals a donor is almost always at hand—probably tied up in the next stall, in fact.

I have never observed any untoward effects from a blood transfusion. I have found it useful as an adjunct to calcium therapy in a cow persistently recumbent or especially where symptoms still persist following, say, two adequate doses of calcium. A quart of whole blood can be regarded as a specific for any shock symptoms associated with treatment of a prolapsed uterus—likewise where haemorrhage follows castration in the colt. Very large doses of maternal blood or serum can be given to the foal affected with joint-ill.

The apparatus used has been described by Williams & Roach[1] although not in connection with blood transfusions, and I find a special needle[2] invaluable in simplifying the procedure and bringing it within the limits of an ordinary visit.

In small animals, donors are often not at hand when required, and difficult to acquire. Although collection of blood direct from the heart under general anaesthesia is simple its administration is next to impossible owing to movement, unless the recipient is also anaesthetized. Even with these obstacles, blood transfusion has a wide and effective field post-operatively and where indicated there are few remedies which will give such satisfactory results.

Yours faithfully,

79, St. Helens Road, F. G. Greer.
Leigh, Lancs.
August 16th, 1947.

References.

1 Williams & Roach. *Vet. Rec.* **57**. 37.
2 Greer. *Vet. Rec.*, June 15th, 1946. **58**. 263.

ONTARIO VETERINARY COLLEGE: AN INVITATION

Sir,—I have the pleasure to convey, on behalf of the Honourable Thomas Kennedy, Minister of Agriculture in the Province of Ontario, the following invitation, transmitted through Mr. J. S. P. Armstrong, Agent General for Ontario, Ontario House, 13, Charles II Street, London, S.W.1:—

"The Ontario Veterinary College, Guelph, will have an official opening of a new wing on July 1st, 1948. It is the wish of Mr. Kennedy and of Dr. MacNabb, the Principal, that an invitation be extended to attend this opening to any members of the veterinary profession of the United Kingdom who may be planning to visit Canada in the summer of 1948.

It would be appreciated if any members wishing to take advantage of this opportunity would write in advance so that suitable arrangements may be made."

Yours faithfully,

Ministry of Agriculture and Fisheries, D. A. E. Cabot.
99, Gresham Street,
London, E.C.2.
August 25th, 1947.

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REPORTS OF PROCEEDINGS OF COUNCIL, R.C.V.S.

Sir,—I am very grateful to Mr. Paul Crosfield for drawing the attention of members to the complete absence of reports from the Council of the R.C.V.S.

Inasmuch as we are expected to elect members annually to this Council, and inasmuch as we are all members of the Royal College, is it too much to ask that we be given some knowledge of the proceedings, especially in view of the important business being transacted in connection with veterinary education and the control of unqualified practice?

Yours faithfully,

49, Cambridge Street, H. E. Smithers.
Aylesbury, Bucks.
August 15th, 1947.

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Sir,—Mr. Crosfield's letter in the last issue of *The Veterinary Record* is a most timely reminder of the absence of published reports of the proceedings of Council, R.C.V.S., during recent months.

The absence of such reports at the present juncture is particularly inopportune following as it does a period of keen interest in the administrative affairs of the profession from almost every member of the R.C.V.S.

Neither the recent activities connected with the status of the profession within the Ministry of Agriculture nor the period of apparent quiescence in matters concerning veterinary education has lessened interest in the latter question and I, for one, feel that an up-to-date report of the proceedings in Council, R.C.V.S., during 1946 and 1947 is overdue.

Yours faithfully,

78, Brentway, Joan O. Joshua.
Finchley, N.3.
August 25th, 1947.

The Ministry of Agriculture is to be approached by the Hide Improvement Society to reimpose the Warble Fly Order at the earliest moment, as it is felt no real progress can be made to eradicate the pest without compulsory dressing.

Revision of Rates for Classified Advertisements

The attention of those concerned is directed to the announcement, appearing on advertisement page vi of this issue, in which are detailed new rates for the insertion of classified advertisements in *The Veterinary Record*.

The introduction of these increased charges—also of an addition to the Box Number fee—has been decided upon, with regret, as one of the measures essential to meet the very heavy increase in the cost of printing the Journal of the Association.

The new rates specified will be payable in respect of all professional and other "small" advertisements published in the September 6th and subsequent issues.

Alterations, as notified direct to advertisers, also will be made in the rates for "display" announcements.